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RESECTION OF PORTION OF THE CHEST WALL AND OF THE DIAPHRAGM, FOR PRIMARY SARCOMA OF THE PLEURA.

(From the Surgical Department of the Prince Galitzin Hospital.)

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ON July 1, 1904, was admitted to the Surgical Department of the Prince Galitzin Hospital, a woman twenty years of age, having a tumor situated in the left wall of the thorax in the axillary line below the left nipple. She dated her illness from the previous April, when she first began to be troubled with violent shooting pain in her left side. Upon examination of the side upon the appearance of the pain she then first noticed under the skin a small tumor, of the size of a hazel-nut; this gradually increased in size thereafter until, at the time of her entrance into the hospital, its dimensions were 7 by 8 cm. Her general appearance was that of health.

When admitted, on the lower part of the left half of the thorax, posterior to the mammillary line, there was a soft tumor of spherical shape, fluctuating, without definite limit, its structure fading into the surrounding tissues. It seemed to be adherent to the eighth and ninth ribs. The skin over the tumor was normal and movable; no enlarged veins; no perceptible enlarged glands in the axilla; all internal organs normal; pulse ranging from 80 to 90.

On July 3, under chloroform narcosis, the growth was exposed. It presented the appearance of muscular tissue, in the centre of which was a cavity filled with blood. The capsule of the tumor was continuous with the muscles of the thoracic wall, part of which were removed with the growth. (Fig. 1.)

From the centre of the space left by the removal of the growth there was revealed an opening which led into the pleural cavity, on either side of which were the edges of the adjacent ribs, the eighth and ninth, which were eroded. The air was freely entering into the pleural cavity through this opening, which was now closed with a tampon of gauze.

The patient, in spite of the pneumothorax, breathed quietly, and her pulse was unaffected. It was now evident that the growth not only involved the parietal pleura, but also it was adherent to the diaphragm. After having opened widely the pleural cavity, it was possible to separate the tumor-mass from the diaphragm without cutting through the diaphragm. Neither infiltration nor nodular masses were visible on the dome of the diaphragm. A large gauze tampon was left in the pleural cavity, its end being brought out from the inferior angle of the wound. The greater part of the external wound was now sutured. The operation occupied about one hour. At its close the patient had developed marked shock, so that an infusion of saline solution was administered.

During the first hours after the operation the patient was groaning and turning about in her bed, but without dyspnoea. Gradually good reaction was established. The temperature gradually rose and in the evening of the third day reached its maximum, 38.4 C. (101.5 F.); respirations, 24; pulse, 120, of good quality. On the fifth day the intrapleural tampon was removed. No entrance of air into the pleural cavity followed this removal, and the wound was left without further tamponing. The healing of the wound progressed well thereafter, the patient having a normal temperature, good appetite and a sense of general well-being. On the eighth day primary union had taken place in the wound, and all sutures were removed. On the fourteenth day she was walking about the ward, the wound completely healed excepting at the point where the tampon had been inserted, where there was still a granulating surface. Auscultation revealed an



FIG. 1.—Primary sarcoma of pleura. Mass removed at first operation.



FIG. 2.—Part of wall of thorax and of diaphragm, removed at the second operation.

increasing expansion of the left lung. On the twentieth day she was discharged from the hospital in a good condition of health.

One month later, she noticed a thickening in the scar, but no pain, no cough; her general condition was apparently good. A gradual redevelopment of unmistakable sarcoma in the cicatrix followed but not until the lapse of four months did she return to the hospital.

In the meantime, the growth had extended greatly over the inferior portion of the left thorax, and by its involvement of the intercostal nerves was provoking great pain. Her general nutrition was still good. On the left wall of the thorax, in the region of the operation scar, sarcomatous nodes were visible, extending from the inferior axillary line downward to the space between the eighth and ninth ribs. The tumor had developed especially along the scar, where it had formed a thick mass with many protuberances, measuring fifteen centimetres in diameter. The skin was bluish, with many dilated veins, and closely adherent to the sarcomatous mass. There were no enlarged glands under the clavicle nor in the axilla or neck; no cough; respiration was deep and quiet. The respiratory murmur in the left lung was feebler than in the right, but could be heard all over the lung; the internal organs were all in good condition.

On November 2 the following operation was done: All the superficial nodes were first removed, when it became evident that they extended not only on the muscles of the thorax, but also on those of the abdomen as far as to the anterior superior spine of the ilium. Then the pleural cavity was again opened by the removal of all the inferior portion of the left thoracic wall from the seventh to the eleventh rib, together with a portion of the diaphragm which was covered with sarcomatous nodes. (Fig. 2.)

Upon opening the pleural cavity, the left lung immediately collapsed, and at the bottom of the cavity there could be seen the rhythmical contractions of the heart. Again the thoracic cavity was filled with a gauze tampon. Threatening heart failure at this moment developed, although the respiration was regular. An infusion of 500 cubic centimetres of saline solution, supplemented by hypodermic injections of camphorated oil and caffeine, overcame this tendency to collapse.

Before resecting the diaphragm it was carefully separated

from the peritoneum. At this moment the patient had a retching which caused the peritoneum to protrude into the pleural cavity like a bladder, while above it the heart was hanging temporarily deprived of its support. The projecting peritoneum was pushed back and held by the hand of an assistant until all the visible diaphragmatic disease had been removed. To the surface of the cut muscles from which the sarcomatous nodes had been removed, both of the thoracic wall and abdominal region, the Paquelin cautery was now applied, after which the cut edge of the diaphragm was sutured to the seventh rib, whereby the thoracic cavity was separated from the abdominal. Every bleeding vessel was carefully ligated; into the inferior angle of the wound a tampon was inserted; the external wound was closed by sutures. The operation occupied seventy-five minutes.

At its close, the patient was in marked shock, but breathed freely. Good reaction was gradually established; the respiration remained quiet, but the patient suffered much from vomiting, which continued for three days, exhausting her. Pulse, 105; respirations, 24; temperature, varying from 37.1 to 37.5 (99-100 F.).

On the fourth day after operation, temperature having risen to 38.3, the superficial dressing was changed; on the seventh day the tampons were removed. The patient had begun to complain of dyspnoea which was not relieved by the removal of the tampons. Temperature 39.2 in the evening, 38.8 in the morning; pulse 120. The eleventh day dyspnoea continued, and a redness along the suture line was noticeable. An exploratory puncture of the pleural cavity was made; neither air nor fluid was found within the cavity, but a stitch abscess along the suture line was opened. Most of the wound had healed primarily. The temperature fell thereafter, gradually, until at the end of one week it had become normal and dyspnoea had disappeared. The patient began to eat, and recovered noticeably her interest in her surroundings. The left lung expanded but the respiration within it was accompanied by some moist râles. The record of November 29 stated that the patient was feeling well, had no dyspnoea, was beginning to sit up in bed; the wound healed except at the site of the abscess.

On December 2, however, she began to complain of pain in

the scar, and two days thereafter a considerable node had developed in the middle of the scar, which two days later was removed and the surface underneath it seared by the actual cautery; some cough, with bloody sputum, followed the narcosis. Temperature rose again to 37.7 and 38.8, with crepitation in the lungs marking a patchy pneumonia. After ten days she again began to feel better and the temperature fell to normal.

December 19 a new sarcomatous node was appreciable near the lower angle of the scar, which was at once removed under local anæsthesia, and the base cauterized. Three days later, a third node appeared at the cut end of the ribs. All further interference was now abandoned.

At the first operation I had removed an encapsulated tumor, flat, ovoid, of soft consistence, and measuring ten centimetres in vertical diameter, nine centimetres transversely and three and one half centimetres anteroposteriorly. The capsule of this tumor was formed by the parietal pleura. The surface of the capsule turned to the lung did not present any deviation from normal in appearance, except thickening. At the point where the capsule of the tumor was adherent to the diaphragm, the remains of muscular fibres are clearly seen, arranged obliquely upon the tumor. On the surface of that portion which emerged between the ribs, the remains of the destroyed ribs and muscle are visible. The cyst-like cavity within the growth, at the time of the first operation, was filled with blood and sarcomatous detritus.

At this first operation we removed portions of several muscles, the serratus magnus and intercostal muscles, together with pieces of the eighth and ninth ribs. At the second operation was removed an enormous sarcomatous growth, with a portion of the scar left by the first operation, and much skin adherent to the growth. This mass weighed 220 grammes, was eighteen centimetres in length, nine in width and five in thickness. The mass consisted principally of exceedingly soft, friable, pigmented material. Microscopical examination showed the pigmentation to be the result of interstitial hemorrhages.

This growth was limited to the subcutaneous fat layer, and the muscular stratum, and did not extend through the pleura. The weight of the entire mass of tissue removed at this operation amounted to 620 grammes.

At this second operation, by an incision which began at the xyphoid process in front, the lower part of the left half of the thoracic wall, including the cartilaginous arch and parts of the eighth, ninth, tenth and eleventh ribs, were removed together with parts of the abdominal muscles which were infiltrated with sarcomatous nodes, and a portion of the musculature of the diaphragm. Microscopical examination showed the tumor to be composed exclusively of round sarcoma cells, with but little stroma; abundant blood-vessels and lymphatics.

Primary sarcoma of the pleura is rare. The principal interest, in my opinion, attaching to this case, is in the removal of so large a part of the wall of the thoracic cavity, and the extension of the operation to the diaphragm. Heretofore, even the wounding of the diaphragm has been considered as a serious occurrence; but, in the present case, it was detached from its normal point of insertion and was brought up to the lower half of the thorax, in spite of which there was not observed in this patient any derangement of respiration, either at the moment of the operation or during the first days following.

The dyspnoea which appeared on the fifth day after the second operation seemed to be due to the formation of an abscess and to inflammatory phenomena in the adjacent pleura. It is noteworthy, also, that in this patient there was an absence of any dangerous crisis from pneumothorax, a condition which every physician is apprehensive of if he has to invade the pleural cavity in an operation, in the absence of preëxisting pleural adhesions. It will be remembered that to obviate this danger, Sauerbruch, under Mikulicz's direction, devised for such operations a particular chamber by means of which there was secured negative pressure of air, amounting to between 12 and 16 mm. of mercury, thanks to which he had, in a

dog, at one séance, performed extensive resection of the thoracic wall on both sides; had incised the œsophagus, and opened the pericardial and mediastinal cavities. The dog bore the operation well, but died two days after. At the autopsy, Sauerbruch demonstrated that neither of the lungs was collapsed.

In another similarly conducted operation upon a dog, Sauerbruch removed two-thirds of one lung, and the dog breathed quietly throughout the operation.

I will not enumerate other proposals which have recently been made for preventing the dangers from pneumothorax. I content myself simply with communicating the experiences in the present case as to their bearing on the dangers of operative pneumothorax, as well as their bearing upon the possibilities of surgical interference with the diaphragm. As far as I am aware, from search through the literature, so considerable a resection of the diaphragm as was done in the second operation performed in this case had been done but once before. Gorhoff has reported in the "Transactions of the Society of Russian Physicians in Moscow," for 1901, the case of a child, aged five years, in which he operated for the removal of an enormous sarcoma of the abdominal wall and the left half of the thorax, with recovery.

In my own case the fatal end was not long delayed. The sarcoma rapidly extended in the site of the scar and in the skin adjacent thereto, pressing upon the left lung, with metastases in the left breast. Death by asthenia occurred January 16, following.

The autopsy demonstrated that, on the left side, the diaphragmatic curtain between the thorax and the abdomen had been entirely restored, the edge of the diaphragm having become adherent where sutured to the lower border of the seventh rib. The left lung was adherent to the parietal pleura, and was stuffed with sarcomatous nodes. The removed diaphragm showed that about two-thirds of the diaphragm had been taken away.